

REMARKS

The Office Action dated October 19, 2005 has been reviewed and carefully considered. Claims 17 and 20-37 are canceled. Claims 1-16, 18 and 19 are pending, the independent claims being 1, 10 and 16. Claims 1 and 16 are amended. Reconsideration of the above-identified application, as amended and in view of the following remarks, is respectfully requested.

Claims 1-15 stand rejected under 35 U.S.C. §102(e) as anticipated by Hasegawa *et al.* (U.S. 6,718,105) ("Hasegawa").

Claim 1, as amended, recites:

a plurality of longitudinal material members consisting of solid material, said members having at least two different indices of refraction, the members being inserted in the holes, wherein distribution of index of refraction of the photonic crystal fiber preform is controlled by arrangement of the members, and said distribution of index of refraction of the photonic crystal fiber preform is changed by change of said arrangement of the members

Claim 10 recites:

a plurality of longitudinal material members having at least two different indices of refraction, the members being disposed in the cylindrical substrate in a photonic lattice structure, wherein distribution of index of refraction of the photonic crystal fiber preform is controlled by arrangement of the members

Support for the amendment of claim 1 is found in original claim 2 and in the specification (e.g., page 7, line 8 - page 8, line 4). Claim 10 is unamended.

Hasegawa fails to disclose or suggest the above-quoted aspects of claims 1 and 10.

Hasegawa, as read by the applicants, discloses an optical fiber with a plurality of voids disposed in photonic lattice structure within a rod-shaped substrate (Column 5, line 26-37). It is disclose that such voids are filled with one of either gas or liquid, a medium with refractive index

that is different from the rod-shaped substrate (Column 3, line 42-46). Moreover, it is disclosed that such voids are surrounded by a plurality of concentric layers ($n_1 - n_4$), layers which may have refractive indices that differ from one another (Column 5, line 21-30; see also Figure 1 of Hasegawa).

As noted above, Hasegawa fills the photonic lattice structured voids with **one of either gas or liquid**. Accordingly, the crystal fiber disclosed in Hasegawa contains a plurality of longitudinal material **members with only one refractive index** disposed in photonic lattice structure.

The failure to teach a crystal fiber having members with at least two different refractive indices disposed in photonic lattice structure is not remedied even if each layer surrounding the voids has different refractive index. As shown in Figure 1 of Hasegawa, the layers (n_1 - n_4) are configured in concentric manner, not in photonic lattice structure. Accordingly, even if the layers have refractive index that differ from one another and/or that differ from the members, Hasegawa teaches, at most, a photonic crystal fiber having **a core with different refractive indices about a radial direction** and a plurality of members with **only a single refractive index disposed in photonic lattice structure**. The applicants respectfully submit that such a fiber differs from, and therefore does not anticipate, the photonic crystal fibers as disclosed in claims 1 and 10.

Moreover, the Hasegawa's crystal fiber, unlike the crystal fibers recited in claims 1 and 10, **is incapable of controlling the refractive index distribution by arrangement of the members**. As noted above, Hasegawa's crystal fiber, unlike present crystal fiber, contains members having only one refractive index. As such, altering the arrangement of such members has no effect on the refractive index distribution of the fiber. Hasegawa's crystal fiber, therefore, does not control the refractive index distribution by altering the arrangement of the members. Instead, Hasegawa's crystal fiber controls the refractive index distribution by **(i) controlling the diameter of voids, (ii)**

substituting glass substrate with another material, and/or (iii) filling the voids with gas or liquid (See Column 6, line 10-14 and line 25-36). Applicant submits that such a fiber is different from, therefore does not anticipate, the present crystal fiber that controls the refractive index distribution by arrangement of the members.

In addition, claim 1, as amended, recites, ". . . a plurality of longitudinal material members consisting of **solid** material. . ."

Hasegawa discloses an optical fiber comprising a core region and a cladding region surrounding the core region, and having a cross-sectional structure in which regions constituted by sub-mediums are arranged in main mediums. At least one of refractive indices of the main mediums (1, 2, 3, 4) and the sub mediums (6) are changed in a radial direction. The sub-mediums (6) of Hasegawa are made of a material such as a gas or a liquid. Hasegawa fails to suggest using "**solid material**" as in the present invention. Moreover, the Hasegawa voids (6) are approximately circular in shape (Col. 5, line 33: "approximately"), and are not uniform in shape as in the present invention. Accordingly, those of skill in the art cannot easily create a solid material in rod shape to fill the void. In particular, **Hasegawa fails to disclose or suggest, ". . . distribution of index of refraction of the photonic crystal fiber preform is controlled by arrangement of the members, and said distribution of index of refraction of the photonic crystal fiber preform is changed by change of said arrangement of the members."** It is additionally noted that the index of refraction is changeable in Hasegawa only in the radial direction; whereas, the present invention can be embodied in various patterns as desired.

Furthermore, present crystal fiber, as recited in claims 1, and 10, exhibits very low optical loss, very low optical nonlinearity, and excellent transmission (Page 10, line 9-14). However, nowhere in Hasegawa is there a disclosure that its optical fiber preform exhibits characteristics of the

present invention. On the contrary, Hasegawa discloses that its crystal fiber simply exhibits a large effective core area (Column 10, line 56-60).

The applicants accordingly respectfully submit that Hasegawa discloses an optical fiber that differs from and that does not teach all features of the crystal fiber recited in claims 1 and 10. As such, applicant respectfully requests withdrawal of the rejections on claims 1 and 10.

Claim 16 stands rejected under 35 U.S.C. §103(a) as obvious over Hasegawa in view of Jakobsen *et al.* (U.S. Pub 2004/0179796 A1) (“Jakobsen”).

Claim 16 recites features similar to those of claim 1. As such, the same arguments relating to claim 1, stated above, equally apply to claim 16. Further, Jakobsen, as read by applicant, is related to fabricating a microstructured optical fiber that reduces propagation losses, splicing losses, and polarization mode dispersion. Nowhere in Jakobsen is there a teaching of plurality of longitudinal material members with **at least two different refractive indices arranged in photonic lattice structure**, where fiber refractive index distribution may be controlled by **arrangement of the members**.

Moreover, present invention, as recited in claim 16, exhibits very low optical nonlinearity and excellent transmission (Page 10, line 9-14). However, nowhere in Hasegawa or Jakobsen is there a disclosure that each optical fiber preform exhibits characteristics of present invention. Accordingly, Hasegawa and Jakobsen, alone or in combination, do not anticipate or render obvious the crystal optical featured in claims 16 and 35.

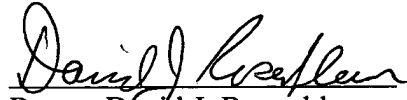
Each of the other rejected claims depends from a base claim that has been shown to be patentable and is likewise deemed to be patentable. Since each dependent claim is also deemed to define an additional aspect of the invention, however, individual consideration of the patentability of each on its own merits is respectfully requested.

Amendment
Serial No. 10/754,027

The applicants submit that the claims, as they now stand, fully satisfy the requirements of 35 U.S.C. 102 and 103. In view of the foregoing remarks, favorable reconsideration and early passage to issue of the present application are respectfully solicited. Should the Examiner deem that there are any issues which may be best resolved by telephone, please contact the applicant's undersigned representative at the number listed below.

Respectfully submitted,

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Date: January 19, 2006

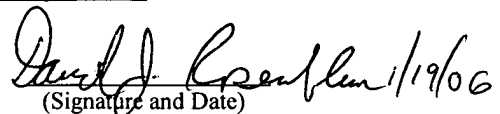
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